

MICHIGAN

AGRICULTURAL EXPERIMENT STATION

STATE AGRICULTURAL COLLEGE.

FARM DEPARTMENT.

TWO PLANTS FOR SANDY LAND

SECOND EDITION.

Spurry (*Spargula arvensis.*)

BY O. CLUTE, Director, and O. PALMER, M. D.

Flat Pea (*Lathyrus silvestris.*)

BY O. CLUTE AND F. B. MUMFORD.

The Bulletins of this Station will be sent free to all newspapers in the State, and to such individuals interested in farming as may request it. Address all applications to the Secretary, Agricultural College, Michigan.

MICHIGAN AGRICULTURAL EXPERIMENT STATION.

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Railroad, Express and Telegraph Address, Lansing, Mich.

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South Haven, Van Buren County, 10 acres rented; 5 acres deeded; Hon. T. T. Lyon, President State Horticultural Society, Local Agent.

SPURRY.

(*Spergula arvensis*.)

CONTENTS.

	PAGE.		PAGE.
Length of time we have experiment-		Pasture	6
ed with.....	3	Hay.....	6
Testimony of Loudon. Dr. Miles,		Seed, threshing.....	6
Swartz, Von Voght, Wolfinger,		Liked by cattle and sheep.....	6
Dr. Kedzie	3-5	Value as a fertilizer.....	6-7
Soil, and preparation of.....	5	Experience of A. J. Rose, W. F.	
Sowing.....	6	Brink and Perry Ostrander.....	7-8
Growth	6		

It has now been about five years since we began experimenting with spurry at our Grayling sub-station, Crawford county, Mich. Its value is so apparent to all who have observed the work there, even superficially, that there seems good reason for making public the results, and recommending the use of the plant to all who are seeking a crop that will be a fertilizer for light sandy soil, and at the same time be of real value for forage.

Spurry is a new plant in Michigan, and probably in most of the states, but it is an old plant in some sections of the world. How old I have not had time to trace, but in Loudon's "Encyclopedia of Plants," first published in 1829, spurry is mentioned as follows:

Spergula arvensis. From *spargere*, to scatter, because it scatters its seed abroad, to the great profit of the farmer in Holland, who obtains from it meadows affording the most delicious butter. *S. arvensis* is a common weed in sandy soils, in Scotland called yarr, and in Norfolk, pickpurse. In the Netherlands and in Germany it is sown on

stubble to provide a bite for sheep during winter. It may be sown and reaped in eight weeks, either in autumn or spring. It is said to enrich the milk of cows, so as to make it afford excellent butter; and the mutton fed on it is preferable to that fed on turnips. Hens eat spurry greedily, and it is supposed to make them lay a great number of eggs, whether in hay, or cut green or pasture. Von Thaer observes it is the most nourishing, in proportion to its bulk, of all forage, and gives the best flavor to milk and butter.

Dr. Manly Miles, of Lansing, formerly professor of agriculture at the Michigan Agricultural College, visited several countries of Europe in 1874 to study the agriculture. He saw fields of spurry, and learned its value from those familiar with it. He gave an address at the farmers' institute at Grayling, in January, 1887, in which he said:

Spurry is an annual which grows wild in Great Britain, where it is usually called a weed. In Belgium, France, Jutland and Russia it is grown as a forage crop and for hay. In France its yield is estimated to be about equal to a crop of clover, or 7,700 pounds per acre. The seeds are fed to cattle and horses, and are thought to be about equal to rape cake in value. It is a quick and rapid growing crop, which in five or six weeks gains its full height of twelve to fourteen inches, and it is said to be a valuable feed for cows, improving the quantity and quality of the butter. Sown in the middle of April with seed at the rate of fifteen to twenty-four pounds to the acre, it matures the last of May, and a second crop may be grown. * * * It has been called the clover of sandy soils. (*Report Michigan Board of Agriculture, 1887, p. 329.*)

Swartz, a well known and influential writer on agriculture in Germany, in his account of the Belgian husbandry, says:

Without spurry, the Campine, the best cultivated soil in the world, would have been still a desert. A plant like this, which requires no manure of itself, and which, even when mown, by the residue it leaves, gives back more than it takes from the soil; which demands no fixed place in the rotation, but which is satisfied to come in as an after crop whenever the soil is at liberty; which, except for the seed, requires no preparation; which is satisfied with a soil on which nothing else but rye will grow; which increases the quantity of milk and butter, and improves their quality, and which I am persuaded may be raised with advantage, even on the best soils, provided only they are somewhat light, is of the greatest value. A proof of this is the land of Waas (Waesland in Flanders), the garden of Europe.

Von Voght, another acknowledged authority, is quite as enthusiastic in regard to the value of spurry on light, sandy soils. He says of it:

It is better than red or white clover; the cows give more and better milk when fed on it, and it improves the land in an extraordinary degree. When sown in the middle of April it is ripe for pasture by the end of May. If eaten off in June, the land turned flat, and another crop sown, it will afford pasture in August and September. This operation is equivalent to a dressing of ten loads of manure per acre. The blessing of spurry, the clover of sandy lands, is incredible when rightly employed.

In the Report of the Department of Agriculture, Washington, 1864, on page 299, is an article by John F. Wolfinger, on "Green Manuring and Manures." Of spurry he says:

Spurry is an annual plant extensively cultivated in Germany and in France as a winter pasture for cattle, sheep and hogs, and milch cows and sheep fed on it yield, according to Von Thaer, of Germany, superior milk, butter and mutton. For winter pasturage it is usually sown broadcast on the harrowed stubble of grain crops just removed from the ground, but it may be and often is, sown in the spring for spring and summer pasture. It is most admirably adapted to sandy soils, so much so that it has been called the "clover of sandy lands." It will grow well on sandy soils that are too poor dry and thin to bear clover, and will also if sown in March, and then again in May, and afterwards in July, produce three crops upon the same field in one season. These three crops will, if successively plowed down to the depth of three or four inches, renovate or strengthen a poor or barren soil to such a degree that it will now bring

clover or a crop of winter grain. Hence spurry is largely grown in Belgium, Germany and Denmark as a fertilizer, and also as a valuable forage for cattle, both in its green and in its dried state.

When, in the spring of 1888, Dr. R. C. Kedzie consented to take charge of a part of the experiment work at Grayling, he imported, through a seed house in New York, some spurry seed from Germany, and had it sowed on the light sand at Grayling on the 17th of May of that year. The season was a most unusual one throughout Michigan. The temperature at the surface of the soil as shown by an uncovered thermometer is known to be eight to ten degrees lower than the temperature at an elevation of four feet indicated by a covered thermometer. Taking the record of a self-registering covered thermometer at the college, at the elevation of four feet, and calculating from it the temperature at the surface, it is shown that there was frost several times during every month of that summer, except July. At Grayling, which is 130 miles further north, the frosts would be still more frequent and severe. To cold was added drouth, which was probably more severe at Grayling than in the southern part of the State. In spite of the cold and the drouth the action of spurry this first season was encouraging. It was placed next to winter vetch as a promising plant for the plains.

The next year gave better climatic conditions. The report says:

The spurry has shown wonderful productiveness and seed production. When partially ripened and plowed under with a very shallow furrow it is self seeding, and produces an abundant crop. Its value as a manurial plant on these light sands is pronounced. When plowed under it seems to enrich the soil the most rapidly of all plants used. It is valuable for a fodder plant, being eaten readily by cows and sheep. It is said to be very valuable for cows giving milk. It is a plant of first value in bringing these sands into productive fields. (*Report Michigan State Board of Agriculture, 1889, page 81.*)

In 1890 the good opinion of spurry continued and increased. The report says:

Spurry still holds its high rank, and this crop is rapidly spreading in this region. With many farmers it yields a great amount of forage and they find it is a profitable crop to feed stock.

The wonderful seed production gives it a good foothold in soils when once sown. The introduction of this plant is a permanent benefit to the jack pine barrens.

The work at the Grayling station has now been for two years in charge of Dr. O. Palmer, who has become a strong advocate of spurry for light lands. The use of it has spread to a considerable extent among the farmers in that section, whose experience and opinions will be quoted further on. Dr. Palmer writes me that every seed has seemed to germinate, and the fields have presented a perfectly even growth of this vine like plant, so thick and thoroughly entwined, that in walking through it the foot has to be lifted entirely over it, or sufficient force used to break the way for each succeeding step. Its average growth has been from 12 to 15 inches in height on the natural soil, but reaching two feet or more on some of the surrounding farms which have been enriched to a greater or less extent, and cutting from one to two tons of forage per acre. When ripe there is at the end of each stalk a round seed vessel, about the size of a No. 6 shot, each vessel containing from one to six seeds. The yield has been from eight to twelve bushels of seed per acre.

The soil for spurry requires the same preparation as for clover. The

seed may be sown and harrowed in the same as clover seed. The seed is smaller than clover seed, hence there are more in number to the pound. When sown for fertilizer and forage, from six to eight quarts should be sown per acre. This thick seeding gives an even field of fine pasture and a heavy sward when cut for hay. When desired for hay it should be cut after the seed has formed, but before it is ripe. When grown for seed it branches more and gives a larger crop of better seed if only about four quarts of seed are sown per acre. When grown for seed it may be threshed the same as clover, by machine or flail. When it ripens late in the fall and is then harvested for seed, enough seed will shell out to produce a full crop next spring if the land is harrowed.

The seed germinates quickly. If the weather is warm and moist the field will begin to show green on the third day from sowing. It is ready for mowing for hay in about six weeks, and will ripen the seed in about eight weeks. It is in best condition for pasture from four to six weeks after sowing, though if necessary animals can be turned on much sooner. It furnishes excellent pasturage for cattle, especially milch cows, though they often refuse to taste it at first, but after once eating it will leave the richest clover pasture to return to it. Sheep seem to prefer it above all forage, and all stock thrive upon it, when cut and cured, even eating every particle of the dry straw that has been threshed for seed.

The introduction of spurry as a forage crop alone, will prove of immense benefit, but its use as a manurial crop is of much greater value. Its effect on the physical condition of the soil is very marked. The soil at Grayling in its natural state is so open and porous, that in passing over a plowed field, one sinks into it as into a heap of dry ashes, but after the plowing under of a single crop of spurry the land becomes so much more compact that the difference will be noticed by the least careful observer. Its effects on the succeeding crops are marked in comparison with the same crop succeeding any other manurial plant used. This may be in part due to the changed condition of the soil giving a more compact seed bed, enabling the new plant better to resist drouth. The spurry itself seems especially adapted to dry soils, doing even better on such soils than where there is an excess of moisture.

There is a tendency for all grasses to grow in bunches on this plains soil. This is true of all those mentioned below, as proven by many trials. But the condition of the soil is so changed after a crop of spurry has been plowed under, that this difficulty is much lessened, and there are now plats of the following grasses very even in growth and forming a uniform sward, viz., timothy and clover, timothy and red top, tall meadow oat grass, red fescue, meadow fescue, sheep's fescue, and alsike clover.

There has not been sufficient time nor extended experiment enough to state definitely the relative increased production following spurry over that of other manures, but I am satisfied that it is far superior, on these lands, to any other manurial plant that has been used. In an experiment on an adjoining farm, more wheat was produced following spurry than where Homestead Phosphate to the amount of 300 lbs. was used per acre.

There are on the experimental farm 10 acres that were broken last spring and sown with spurry, which was plowed under in August, and the land sown with wheat. On the farm opposite is a plat of wheat following

clover, and one following timothy, which had been fairly well covered with barnyard manure. The wheat on the spurry field went into winter looking stronger than either of the other fields. The result next summer will be watched with great interest.

It is believed the results already obtained by the introduction of this plant will much more than repay all the outlay that has been made at the Grayling station. The many other valuable results remain in favor of the continued work. The work of the station has just begun. Its future may develop more financial good to the State, than, perhaps, any work now in progress.

The farmers in the neighborhood of Grayling have carefully observed the action of spurry from the first. To some of them seed was given to try on their own farms, and in every case where they experimented with care they have had good success, and are now warm friends of the new plant. From some of them have come letters stating their experience with the plant and their opinion of its value. Several of these letters are here given.

Grayling, Mich., January 14, 1893.

PRES. O. CLUTE, *Director Experiment Station, Agricultural College, Mich.:*

DEAR SIR—I have given the growing of spurry two fair trials. The first one was for fertilizing my land. I mowed four swaths 34 rods long, after it had been ripe about six or eight days, and got seven bushels of seed. I tried the dry straw for stock the next winter. Cows ate it well. Horses did not like it.

My second trial was for pasture and experiment. I like it for pasture and I like it for plowing under. It helps the land as well or better than clover. With proper care 15 or 20 bushels of seed can be raised to the acre.

Truly yours,

A. J. ROSE.

Grayling, Mich., 1st, Feb., 1893.

PRES. O. CLUTE, *Director of the Experiment Station:*

DEAR SIR—As a fertilizer spurry is next to clover. It will grow where clover will not. I sowed some on a piece of ground where the clover would not catch. In the fall I plowed it under and sowed the land with clover and timothy and got a good catch. Also last spring I sowed two acres of an eighteen acre field to spurry. In the fall I plowed the whole field and sowed it to wheat. I could tell to the very drill mark where the spurry was. The wheat was larger and thicker on the ground.

As for pasture there is nothing like it. Cattle and sheep will eat it as soon as they will clover. I sowed a small piece last summer for sheep pasture, and when it got up five or six inches high I turned the sheep into it. They ate it as close to the ground as they could. Last June I sowed five acres with turnips and spurry, and the spurry smothered the turnips out and I got a fair crop of it. In August I cut about four acres for seed. The second or self sown crop came on and was as large as the first. This winter I threshed out what I had, and there were thirty bushels of good seed from the four acres. The sheep ate the straw as well as they did the best hay.

Truly yours,

W. F. BRINK.

Grayling, Jan. 30, 1893.

PRES. O. CLUTE, *Director of Experiment Station, Agricultural College, Mich.:*

DEAR SIR—I will give you my experience and opinion in regard to growing spurry. Opinions certainly have more weight when based upon experience. The land that I sowed to spurry last year was so-called "pine barrens," or plains, rather better than the average. On it I had raised crops as follows: wheat, millet, oats, part potatoes and part peas, part corn and part millet—making in all five crops, leaving the soil in an impoverished condition. I plowed just five acres, dragged it with a flat drag, then

sowed six pounds of seed per acre. I dragged once and then raked both ways with a horse rake, finishing June 15 at noon. I was surprised to find the young plants all up on the 18th of June at noon. August 18 the crop was ready to harvest. It stood about one foot high. I have made no estimate as to the amount per acre. One-half ton per acre would have been a good crop for that soil. There was certainly more than that. I did not see the field again until four weeks after cutting, when one day I was surprised at the green appearance of the stubble. Upon examination I found a volunteer crop which continued to grow until there was about two-thirds as much as at first. Wishing to use the fall pasture in other parts of the enclosure I turned my cows in. For about three days they would not notice the spurry. But after they "got a taste" they would eat nothing else so long as the spurry lasted. There was a decided increase in the quantity of milk. Also the quality was improved.

When allowed to ripen for seed I thresh it with a flail. I feed the straw to my cows together with a ration of turnips. The result is highly satisfactory, the cattle never doing better. The only trouble was in not having enough, as when the spurry was gone they refused to eat other fodder until starved to it. The crop as a whole was worth more than double any previous crop. I know that it will grow where other crops fail, also that it is the best of fodder crops for cattle and sheep. As far as I know horses do not like it.

As a manurial crop I think it will be excellent, but will test it thoroughly both by plowing under, and also by leaving on the ground as a top dressing, and protection for young clover, which I shall sow and drag in after the first harvesting.

It is my opinion, gained by experience and observation, that spurry if rightly handled will be of great value in reclaiming the pine barrens. Any plant that will grow here that will make fodder for cattle and sheep will be welcome, as sheep raising will sooner or later be the leading industry here.

Yours very truly,

PERRY OSTRANDER,

Pres. of the Crawford County Farmers' Association.

Dr. Palmer thinks that spurry will prove a valuable crop for plowing under as a fertilizer for orchards, but of this we have not yet had experience. On the plains it has not proven troublesome as a weed, but it may be well to be cautious on this point when the crop is grown on richer soil. Experience will soon prove whether there is anything to fear.

O. CLUTE, *Director.*

February, 1893.

NOTE TO SECOND EDITION.—Though we published an edition of 8,000 copies of this bulletin, No. 91, it is exhausted within a few weeks of its issue. A second edition is called for. A very large number have written us, inquiring where they can procure spurry seed. The station had a small quantity, and several parties at Grayling had a few bushels, which was soon taken. All inquirers are now referred to D. M. Ferry & Co., Detroit, Mich. and to J. M. Thorburn & Co., 15 John street, New York. Their prices are as follows:

100 pounds for.....	\$9 00
50 pounds for.....	6 00
6 pounds for.....	1 00

The above packages will be sent by freight or express, charges paid by purchaser. It will be a good way for several parties in a neighborhood to join together, and order 50 or 100 pounds. The same firms will send one pound of seed by mail, postage paid, for 28 cents. Four pounds can be sent in this way, in one package, at a cost of \$1.12 for seed and postage. Write to D. M. Ferry & Co., or to Thorburn, as above, and inclose money with order.

O. C.

May 8, 1893.

FLAT PEA.

(*Lathyrus silvestris*).

CONTENTS.

	PAGE.		PAGE.
A special purpose plant needed.....	10	Endures frost.....	11-12
Claims made for the flat pea.....	10	Winters well.....	11
Soil.....	10-11	Transplanting.....	11-12
Planting.....	10-11	Yield of green forage.....	12
Germination.....	11	Liked by cattle.....	12
Cultivation.....	12	Bloom and seed.....	13
Growth of tops and roots.....	11-12	Summary.....	12-13
Tubercles.....	11-12		

Can the light sandy soils of northern Michigan be converted into fertile farms, where at present prices of land and labor and farm products men can win a livelihood and make comfortable homes? This is "the problem of the plains." In solving this problem we have several known quantities: the question of how many quantities at present unknown remains to be seen. Among the known quantities are:

1. A soil of light sand, usually of several feet in depth, often of many feet in depth, having very little if any vegetable mold.

2. Long, cold winters, in which the thermometer sometimes sinks as low as 30 degrees below zero. But usually vegetation is protected by a garment of snow.

3. A possibility, not to say probability, of untimely frosts. Frosts linger late in the lap of spring, they come with swift feet in the fall as to their home; sometimes visits are made at intervening times.

4. An uneven distribution of rainfall. Enough rain falls in the course of the year, but sometimes for several weeks in mid-summer there is no rainfall, or but little. The hot sun beats on the hot sand and scorches vegetation unless it has unusual powers of endurance.

A deep, sandy soil, zero winters, frosts late and early, a summer sometimes hot and dry,—such conditions are severe. As mentioned in the preceding part of this bulletin we find spurry a great help. Its quick germination, its maturity in six to eight weeks, its excellent forage for cattle and sheep, its superior fertilizing properties will continue to make it invaluable. But spurry, if one expects a full crop, must be sown for each crop, as the plant dies after seeding, and the volunteer crop, while often large, cannot be depended upon; it is more tender to the touch of cold than is desirable, sometimes being killed by untimely frosts; it does not root deeply in the soil and hence may be injured by drouths.

Can we find a plant that is perennial, that will not be cut down by pretty severe frosts, that roots so deeply as not to be greatly injured by severe drouths, that yields superior forage for all all farm stock, and that has valuable qualities as a fertilizer?

If this question can be answered in the affirmative we shall have solved "the problem of the plains," for then we can convert them into farms for breeding cattle and sheep; for producing meat, butter, cheese and wool: and be able at the same time, from the manure produced by the stock and from the fertilizing qualities of the plant, to improve from year to year the quality of the soil.

In thinking over this problem it seemed wisest to look among the legumes for this possible, if improbable, plant. Among the legumes we find the clovers, the cow-pea, the vetches, and beans and peas, all of which are of great service for forage and fertilizing, some of which are among the most important crops in the world. There are many other legumes found in nearly all climates. If the plant we are seeking can be found at all it will most probably be found among the legumes.

Having reached this conclusion I began to ask questions of those familiar with leguminous plants, and to look for hints among books and periodicals as far as other most pressing duties would occasionally permit.

While engaged in this search there came to my desk early in January, 1891, a circular making such glowing claims for a new plant, the flat pea, (*Lathyrus silvestris*), that I was at first inclined to pass it by. But after all it seemed worth while to experiment with the plant, for if the results reached were only negative they would serve to warn others against loss of time and labor and money. I sent to London, England, for five pounds of the seed, and wrote to several parties in Germany asking about the plant. I learned that the flat pea is a perennial which has long been known to botanists, that in its wild state it contains some elements that make it unpalatable and unhealthful to animals, but that Herr Wagner, of Wurtemberg, has been experimenting with it for many years, and that it is claimed that he has bred out the undesirable qualities, leaving a plant most valuable for forage and fertilizer, and adapted to different soils and climatic conditions.

The seed came to hand early in March, 1891, plump, clean, apparently in good condition. I sent a small quantity to our sub-station at Grayling, where it was planted all right in May, 1891. But when it was planted the weather was dry, and after planting there was no rain until late in summer. The seed did not germinate at all. In this failure to grow it was not alone, for seeds of other plants in adjacent plots did not germinate, or else came only to a feeble growth after the fall rains began. In the spring of 1892 I sent more seed to Grayling, which germinated at the right time.

The plants made a top growth of six to eight inches and a root growth of twelve to fourteen inches, the roots running well down into the soil and being supplied with many tubercles, such as have attracted such wide attention within a few years as the agents in secreting nitrogen from the air. In 1892 I sent to Grayling a few dozens of plants of the flat pea from among those grown at the college, which were set out and made a promising growth of tops and roots, the roots showing the marked tendency to run deep and to be well supplied with tubercles.

Desiring to have personal supervision of the care of the plant and to watch its action, and also to get a quantity of the plants to producing seed as soon as possible, I determined in the spring of 1891 to sow much the larger part of the seed on a sandy knoll at the college. This knoll had been under cultivation for a number of years, and had been fertilized from time to time, hence the growth of the flat pea here cannot be taken as indicative of what it will do on even lighter and entirely unfertilized soils, but this plot was in about the same condition and had about the same history as much of the sandy soil in large areas of southern Michigan. The seed was sown about 3 in. deep in drills $2\frac{1}{2}$ ft. apart, May 8, and a few days later. The seed has a very hard outer coat, and germinates slowly. The seed was sown in a dry time, and only a little rain fell for some weeks. The soil was full of the seeds of weeds which started in great profusion, and by the time the flat pea was up at the end of twenty-three days, the weeds were so well grown that it was vain to try to exterminate them and save the plants of the pea. The whole plot had to be plowed up.

In order to insure against the destruction of all the plants by a possible drouth, I had selected in the beginning a low place in the garden, sufficiently near the forcing house to carry water in a hose for watering, in case of need. The soil was deep muck, and had been well cultivated for some years. It was chosen not for the purpose of showing the capacity of the flat pea to grow on poor soil, but for the purpose of trying to insure the growth of some plants from a portion of the costly seed.

Here the seed was planted fully three inches deep, about two inches apart in the drills, and the drills fifteen inches apart. It came up in three weeks, every seed seeming to germinate. Rain came, so that it was not necessary to water. The plants made a vigorous growth, and by fall were twelve to fifteen inches high. They were healthy, strong, luxuriant. The roots grew deep and wide, extending twenty-four inches down and fifteen to twenty inches on each side. They were abundantly supplied with nitrogen-secreting tubercles, or rather with tubercles to serve as homes for the nitrogen-secreting bacteria. In the cool weather of the fall the plants thrived well. The first frost of the season came the night of October 7. The plants showed no evil effects. Frosts followed on October 8 and 9, but still the plants were green and vigorous. Other frosts on subsequent nights and days affected the plants slowly, some of the leaves turning yellow and the whole plant becoming somewhat brown, but when college closed in the middle of November the plants were still growing. The really cold weather had been slow in coming.

The plants wintered well. All started growing as soon as frost was out in the spring. April 2d, the rows were green. The plants had been grown in the rows close together. I desired to give them more room and to get them upon sandy soil, hence upon April 19 they were all transplanted, except three rows which were left in the muck. They were put upon the

land where the year before the weeds had smothered the plants. In digging we found all the roots strong and fleshy, and the smaller ones with many tubercles. In transplanting, the roots were cut to about six inches in length. They were planted in rows fifteen inches apart, and four inches apart in the row. They grew well throughout the spring and summer. The rows were cultivated sufficiently to keep the weeds down, which was an easy task, as the pea vines soon covered the ground.

In August and September one-tenth of an acre yielded 1,046 lbs. of green forage, or 10,460 lb. per acre. It is probable that the yield would have been larger had the plants grown on the soil, so as not to need transplanting, as this checked the growth. The green forage was fed to cattle quite liberally and seemed to be greatly relished.

The flat pea had given such indication in its first year (1891) with me that last spring (1892) I procured ten pounds more of the seed, which was sown on the sandy knoll where I first began, and adjacent to the plat to which the plants grown on muck the previous year had been transplanted. The seed was again put in rows $2\frac{1}{2}$ feet apart.

Taught by the experience of the previous year I directed turnip seed to be sown over the flat peas. That is, the peas were sown with a drill about two inches deep. Another drill followed, and sowed turnip seed about an inch deep in the same row. The turnip seed germinated very soon, and marked the rows so that they could be cultivated, and so keep the weeds down. The turnips were pulled out as soon as no longer needed. The flat peas germinated well. The earliest plants appeared at the surface in 17 days and others followed rapidly, so that a few days later all were up. There had been plenty of rain, and the weather was fairly warm. In a dry, cool season, the plants would be longer in getting to the surface.

The plants were kept free from weeds, the horse cultivator and the hand hoe being used. The cultivation must be carefully attended to. If in one year a grower were starting a large area of plants the cultivation would become a somewhat serious problem. The plants made a very satisfactory growth, reaching before cold weather a height of 12 to 15 inches, and having roots 18 to 24 inches long, with plenty of tubercles. Again, as frosts came on they kept a green and thriving look until the ground froze, about Dec. 1.

The plants of the year 1891, left in the spring of 1892 to grow on the muck, did not do very well. The early part of the season was quite wet, and water often stood around the plants, and probably they had wet feet all the time. Still they lived and grew. All will be removed next spring.

Our experience with the flat pea for two years is:

1. It germinates and reaches the surface in from 17 to 28 days.
2. It grows slowly at first after reaching the surface, and needs care to keep weeds down.
3. It makes, on very poor, unimproved sandy soil, a top growth of six to eight inches and a root growth of 12 to 15 inches, the first year.
4. It makes on sandy soil that has been cultivated and improved, a top growth of 12 to 15 inches, and a root growth of 18 to 24 inches, the first year,
5. The tops are not easily cut down by frost. The roots go through the winter well.
6. The roots are thickly supplied with tubercles.

7. One year old plants transplanted in the spring to sandy soil, gave at the rate of 10,460 pounds of green forage per acre.

8. It does not bloom the first year. With us the blooms, pods, and seeds have been few the second year.

9. Cattle eat the green forage readily.

During the coming season the experiment will be continued. The action of the plants on the sandy soil at Grayling will be carefully watched, as will that of the two-year-old plants, and the large plat of one-year-old plants at the college.

Reports that this station has this plant in cultivation crept into the papers, and letters have been coming asking about it, therefore it seemed best to make this report of progress at this time.

We have none of the peas and none of the plants for sale or to give away.

O. CLUTE,

Director of Experiment Station.

February 15, 1893.

NOTE TO SECOND EDITION.—Many letters have been received, asking where seed of *Lathyrus silvestris* can be bought. I believe there is no seed in America. I procured ours from F. E. Clotten, 258 High Holborn, London, England. At first it was a guinea a pound. It is now ten shillings sixpence (sterling) a pound, by mail. The plant gives promise. I hope that it will prove a valuable addition to our forage crops. But our experience with it is so limited that I can, as yet, hardly recommend it. After further experience with it I shall know more about it.

O. C.

May 8, 1893.

